A COMPARATIVE "STUDY ON RETROMUSCULAR PREPERITONEAL (SUBLAY) VERSUS PREFASCIAL (ONLAY) MESH REPAIR OF VENTRAL HERNIAS"

A STUDY OF 50 CASES

Dissertation submitted for

BRANCH – I M.S (GENERAL SURGERY)

April 2016

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI

CERTIFICATE

This is to certify that the dissertation titled **"A COMPARATIVE STUDY ON RETROMUSCULAR PREPERITONEAL (SUBLAY) VERSUS PREFASCIAL (ONLAY) MESH REPAIR OF VENTRAL HERNIAS"** submitted to the Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of M.S Degree Branch-1 (General Surgery) is a Bonafide work done by **Dr.Dilip.L** post graduate student in General Surgery under my direct supervision and guidance during the period of July-2014 to August-2015.

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DECLARATION

I, Dr.DILIP.L solemnly declare that the dissertation titled **"A COMPARATIVE STUDY ON RETROMUSCULAR PREPERITONEAL (SUBLAY) VERSUS PREFASCIAL (ONLAY)) MESH REPAIR OF VENTRAL HERNIAS"** has been prepared by me at Department of Surgery, Coimbatore Medical College, Coimbatore, in partial fulfillment of the regulation for the award of **M.S. (GENERAL SURGERY)** degree examination of The Tamil Nadu Dr. M.G.R. Medical University, Chennai to be held in April 2016

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College : Coimbatore Medical College

Dissertation Topic : Comparative study on retromuscular preperitonial (sublay) versus prefascial (onlay) mesh repair of ventral hernias.

The Ethics Committee, Coimbatore Medical College has decided to inform that your Dissertation Proposal is accepted / ~~Not accepted~~ and you are permitted / ~~Not permitted~~ to proceed with the above Study.

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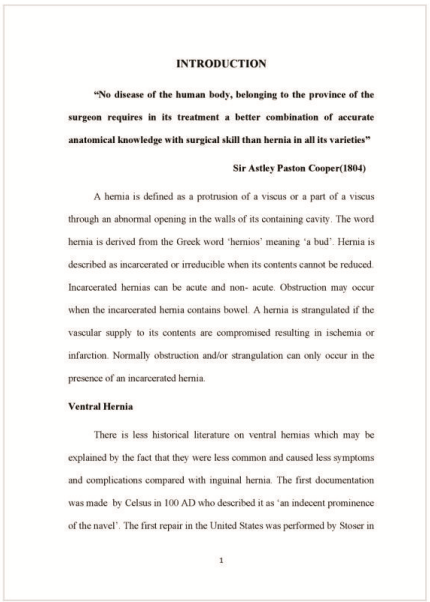

INTRODUCTION

"No disease of the human body, belonging to the province of the surgeon requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than hernia in all its varieties"

Sir Astley Paston Cooper(1804)

A hernia is defined as a protrusion of a viscus or a part of a viscus through an abnormal opening in the walls of its containing cavity. The word hernia is derived from the Greek word 'hernios' meaning 'a bud'. Hernia is described as incarcerated or irreducible when its contents cannot be reduced. Incarcerated hernias can be acute and non- acute. Obstruction may occur when the incarcerated hernia contains bowel. A hernia is strangulated if the vascular supply to its contents are compromised resulting in ischemia or infarction. Normally obstruction and/or strangulation can only occur in the presence of an incarcerated hernia.

Ventral Hernia

There is less historical literature on ventral hernias which may be explained by the fact that they were less common and caused less symptoms and complications compared with inguinal hernia. The first documentation was made by Celsus in 100 AD who described it as 'an indecent prominence of the navel'. The first repair in the United States was performed by Stoser in

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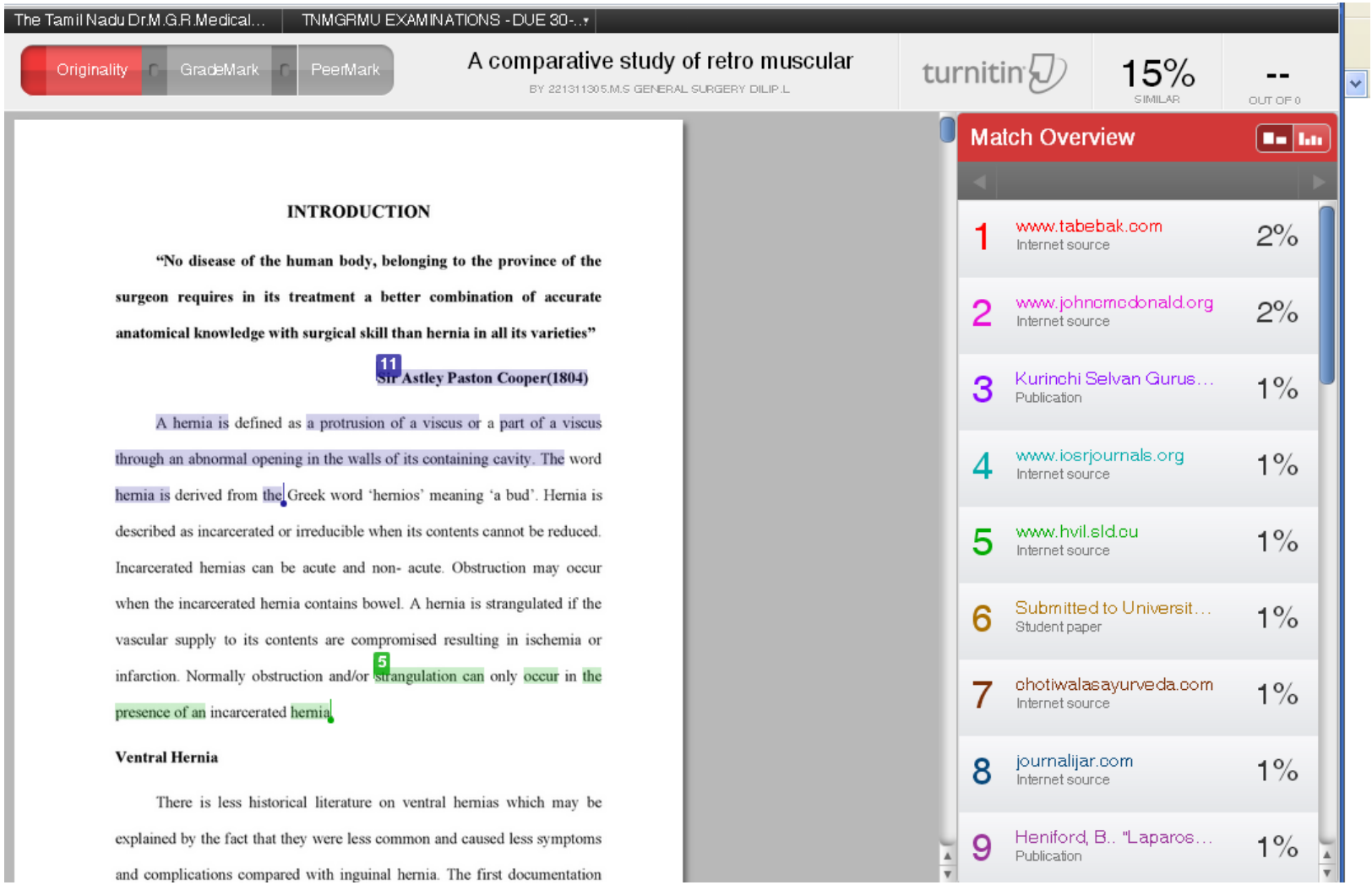
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1894. Mayo described his repair technique in 1898 and in 1901 he described the ‘vest-over-pants’ technique. Epigastric hernias were first described in 1285 by Arnauls de Villeneuve. The first successful repair of an epigastric hernia was described in 1802. Historically there was a belief that epigastric hernias were associated with intra-abdominal pathology and operations on these hernias were carried out to treat symptoms from diseases such as peptic ulcer disease. The abdominal wall closure was also first documented by Celsus in 100 AD. Onecentury later Galen described the closure of the abdominal wall including his preference towards the paramedian incision. Incisional hernias were uncommon before the days of anesthesia, asepsis and anti-sepsis as abdominal surgery was carried out infrequently. By the beginning of the twentieth century the incidence of incisional hernias increased and caused surgeons to consider this problem carefully. This brings us to the present day repair of incisional hernias.

Ventral Hernias

Ventral hernia, for the purposes of this thesis, is the term used to describe umbilical, epigastric and incisional hernias. Umbilical and paraumbilical hernia will be collectively referred to as umbilical hernia

Umbilical Hernia

Umbilical hernias account for approximately 5% of all primary hernias.

Incisional Hernia

Incisional hernia, otherwise called as postoperative hernia is a diffuse extrusion of peritoneum and abdominal contents through a weak scar of a previous surgery, described by Ian Arid.

The development of knowledge of aseptic surgery and anesthesiology enabled surgeons to enter the abdominal cavity with increasing safety and led to phenomenal increase in abdominal surgeries. Incisional hernia is a frequent complication of abdominal surgery constituting about 3% to 11% of laparotomy.

There are various factors responsible, like the patient characteristics and the underlying disease process and the iatrogenic factors, like technique of wound closure and use of suture material. It usually starts after surgery, as a result of failure of the lines of closure of the abdominal wall following surgery. They can incarcerate (6 to 14%), strangulate (2%) or cause skin necrosis, all of which markedly increase the risk of patient's life. They are also responsible for considerable economic loss to the patient and the family. So these patients have to be operated as early as possible.

Various surgical techniques have been developed for this challenging disease. The use of sheets of non-absorbable synthetic mesh prosthesis placed across the defect and stitched to the abdominal wall has

revolutionized the repair of abdominal wall defects and has rendered the older type of surgeries obsolete.

Here the emphasis has been laid on the type of prosthetic reinforced, repair, choice of prosthetic material, suture selection, wound closure, use of closed suction drainage and preoperative and postoperative care. The available literature on the subject is covered in detail and some of the surgical procedures have been described in detail.

AIM OF THE STUDY

1. To compare the ease and duration of surgery
2. To compare the duration of hospital stay.
3. To compare the various complications following the ventral hernia repair like seroma, wound infection and recurrence.

REVIEW OF LITERATURE

Umbilical Hernia

Umbilical hernias account for approximately 5% of all primary hernias.

Risk Factors for Umbilical Hernia[14,22]

Approximately 90% of adult umbilical hernias are acquired rather than due to the persistence of infantile umbilical hernias. Predisposing factors to umbilical hernia include any condition resulting in increased intra-abdominal pressure such as obesity, multiparous women, ascites and intra-abdominal malignancy. Biomechanically the umbilical zone is naturally weaker because it allows more transverse stretch. The prevalence of umbilical hernia during and after pregnancy is not well documented in the literature. Approximately one-fifth of patients with liver cirrhosis and ascites will develop an umbilical hernia. This is multi-factorial from the ascites causing increased intra-abdominal pressure, weakening of abdominal wall fascia and muscles from poor nutrition, and also dilatation of the umbilical opening from umbilical varices.

Surgical Management of Umbilical Hernia

Umbilical hernia repair can be open with or without mesh or laparoscopic with mesh. The Mayo repair which used an overlapping ‘vest-over-pants’ repair of the fascia with non-absorbable sutures was described in 1901. Another popular technique without mesh used interrupted transfascial sutures to close the umbilical hernia defect transversely. Mesh repair was later developed due to high recurrence rates associated with sutures repairs and this can be carried out open or laparoscopically.

Epigastric Hernia

The prevalence of epigastric hernia is around 3 to 5% of the population and is more common in men than women. It more frequently affects younger people between 20 and 50 years of age. The risk factors for epigastric hernia are similar to those for umbilical hernia and it is not uncommon for studies to group the two types of ventral hernia together. The surgical management of epigastric hernia is the same as for umbilical hernia.

Incisional Hernia:

Incisional hernia is a diffuse extrusion of abdominal contents through a weak surgical scar. A postoperative ventral, or incisional hernia is the result of failure of line of closure of abdominal wall following laparotomy.

Incisional hernia are variously reported as occurring in 6-12 percent of abdominal surgeries.

SURGICAL ANATOMY OF ANTERIOR ABDOMINAL WALL

Anatomy of the Anterolateral Abdominal Wall[5,7]

Good knowledge of the abdominal wall anatomy is essential for understanding abdominal wall hernias and the principles of hernia repair. The boundaries of the anterolateral abdominal wall are the costal margins and xiphoid process cranially; the mid-axillary lines laterally; and the anterior part of the pelvic skeleton and symphysis pubis caudally. The muscles consist of the rectus abdominis and the three flat muscles, namely the external oblique, internal oblique and transverses abdominis.

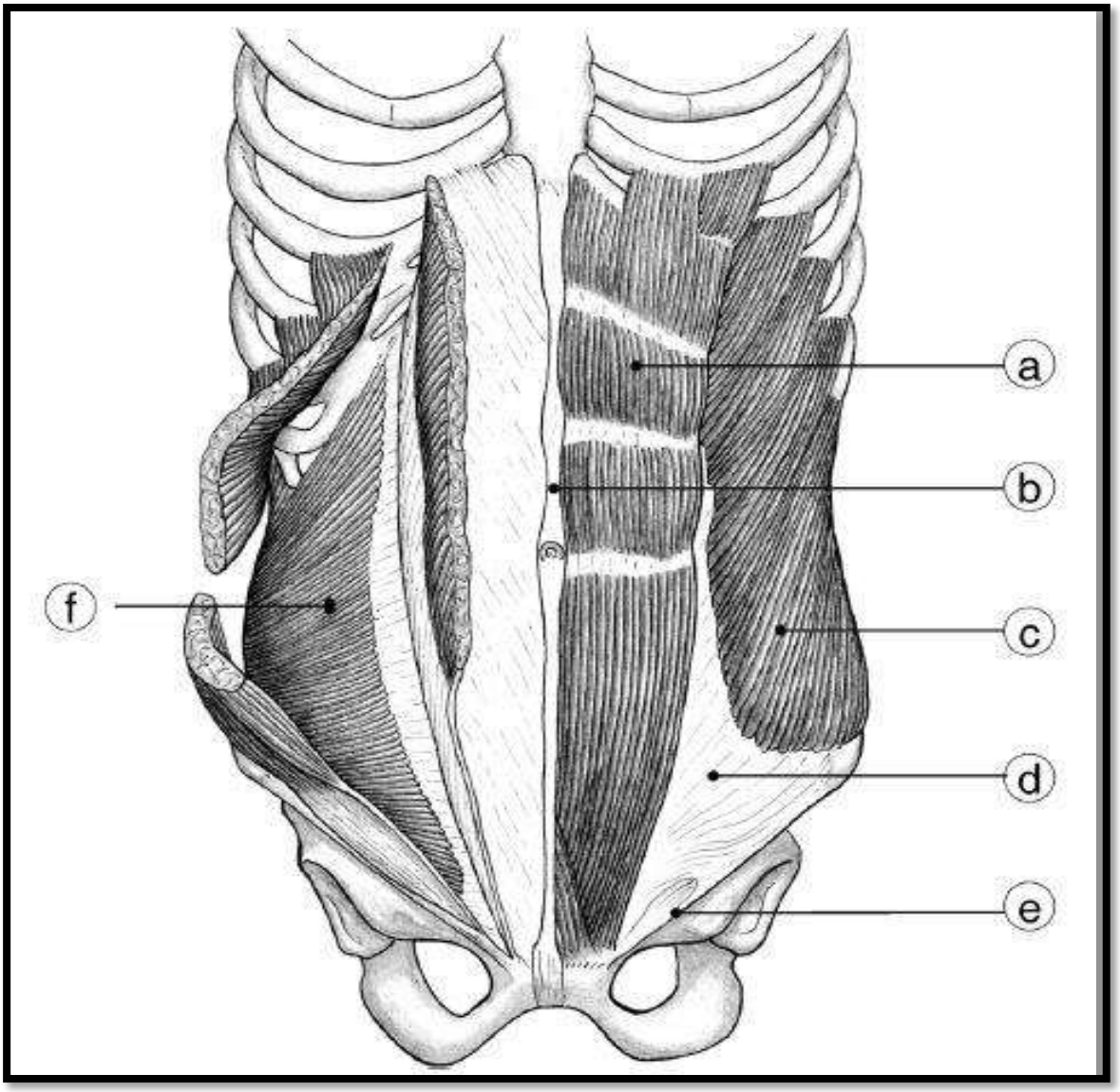


Figure 1: Anatomy of the Anterior Abdominal Wall

A – rectus abdominis, B – Linea Alba, C – External Oblique, D External Oblique Aponeurosis, E - Inguinal Ligament, F – Internal Oblique. Reproduced with permission from *Component Separation Technique to Repair Large Midline Hernias* by Bleichrodt RP etal.7

The rectus abdominis run vertically on either side of the linea alba which is formed by the fusion of all the aponeurosis of the flat muscles into the midline to form a strong fibrous structure. The external oblique aponeurosis forms the anterior layer of the rectus sheath and the muscle functions to lower the ribcage such as in expiration. The internal oblique lies deep to the external oblique and its unilateral contraction allows rotation and lowering of the ribs on the one side. The transverses abdominis is the main muscle responsible for retaining the abdominal viscera. Contraction of this muscle results in a pull along the midline and therefore contributes to the separation of a midline laparotomy wound. The transversalis fascia lies deep to the transverses abdominis which is structurally weak above the umbilicus but structurally more robust at the region of inguinal canal.

The abdominal wall is a complex musculo-aponeurotic structure that is attached to the vertebral column posteriorly, the ribs superiorly, and the bones of the pelvis inferiorly. The abdominal wall protects and restrains the abdominal viscera, and its musculature acts indirectly to flex the vertebral column. The integrity of the abdominal wall is essential to the prevention of hernias, whether congenital, acquired, or iatrogenic.

The abdominal wall can be conveniently divided into

1. Antero-lateral wall and

2. Posterior wall

The antero-lateral abdominal wall is composed of seven layers. From out inwards, they are

1. Skin

2. Subcutaneous tissue

3. Superficial fascia (Scarpa's fascia)

4. Muscles and their aponeurosis

5. Transversalis fascia

6. Pre-peritoneal areolar tissue

7. Peritoneum

Skin

The skin is lax and not adherent, except at the linea alba and the umbilicus where it adheres firmly.

Subcutaneous tissue

Contains a layer of soft adipose tissue that generally increases with age. It contains little fibrous connective tissue and affords little strength in closure of abdominal incisions.

Scarpa's fascia

Scarpa's fascia is layer of fibrous connective tissue of modest thickness. The layer affords little strength in wound closure, but its approximation aids considerably in the creation of aesthetic scar.

Muscles and their aponeurosis

Muscles of antero-lateral abdominal wall consists of four large flat muscles and two small muscles.

Flat muscles are:

1. External oblique
2. Internal oblique
3. Transversus abdominis
4. Rectus abdominis

Small muscles are:

1. Pyramidalis

2. Cremaster

External oblique muscle

This is the largest and thickest of flat abdominal muscles. Origin: Eight fleshy slips from middle of the shaft of lower eight ribs. Direction of fibres: Downwards, forwards and medially. Insertion: By a broad aponeurosis through which they are inserted from above downwards into xiphoid process, linea alba, pubic symphysis, pubic crest and pectineal line of the pubis.

Lower fibres of the muscle are inserted directly into the anterior two third of the outer lip of iliac crest.

The margin of the part of aponeurosis is a thick band folded internally upon itself to present a grooved upper surface, this is the inguinal ligament.

Internal oblique muscle

The internal oblique muscle lies beneath the external oblique.

Origin: Lateral two thirds of inguinal ligament.

Anterior two third of intermediate area of iliac crest.

Thoracolumbar fascia.

Direction of fibres: upwards, forwards and medially.

Insertion: Uppermost fibres are inserted directly into the lower three or four ribs and their cartilages.

Greater part of the muscle ends in an aponeurosis through which it is inserted into the seventh, eighth and ninth costal cartilages, the xiphoid process, linea alba, pubic crest and pectineal line of pubis.

Transverses abdominis muscle

This is the smallest of the three flat muscles of the abdomen.

Origin: Lateral two third of inguinal ligament.

Anterior two third of inner lip of iliac crest.

Thoracolumbar fascia.

Inner surface of lower six costal cartilages.

Direction of fibres: Horizontally forwards

Insertion: By a broad aponeurosis which is inserted into xiphoid process, linea alba, pubic crest and pectineal line of pubis.

Rectus abdominis and rectus sheath

The recti abdomini are long, broad muscles lying longitudinally in the medial aspect of the abdominal wall. Each arises from the front of the symphysis and the pubic crest, and inserts into the xiphoid process and the cartilages of the fifth to seventh ribs. Each is enclosed in a sheath. Three to five tendinous intersections cross the rectus muscle. They are attached to the anterior portion of the rectus sheath and hence serve to prevent the retraction of the muscle in transverse incision.

Pyramidalis is a small triangular muscle superficial to the rectus muscle, arising from the front of the pubis, and inserting into the linea alba approximately half way between the pubic symphysis and the umbilicus.

Above the arcuate line the posterior rectus sheath is composed of fascia from the posterior lamella of the internal oblique muscle, the transversus abdominis muscle, and transversalis fascia. Anteriorly, the rectus sheath is composed of the external oblique aponeurosis and the anterior lamella of the internal oblique aponeurosis.

Below the arcuate line, which is the point at which the inferior Epigastric artery enters the rectus sheath, the posterior rectus sheath is lacking because the fasciae of the flat muscles pass anterior to the rectus muscle. The muscle, below the semicircular line, is covered posteriorly by a thin layer of transversalis fascia.

Linea alba

The recti muscles are held close together near the anterior midline by the lineaalba. The linea is so called, because it is a white line. The linea alba itself has an elongated triangular shape, and is based at the xiphoid process of the sternum. The linea alba narrows considerably below the umbilicus, so that the medial edge of one rectus muscle may actually overlap the other.

Transversalis fascia

The integrity of the transversalis fascia is absolutely essential for the integrity of the abdominal wall. If this layer is intact, no hernia exists. A hernia can be defined as a defect in the endoabdominal fascia or transversalis fascia. This definition applies to oesophageal hiatus hernia, umbilical hernia, inguinal hernia, femoral hernia, and incisional hernia.

Pre-peritoneal connective tissue layer

This layer loosely attaches the abdominal wall with the peritoneum, which can therefore be easily stripped.

Peritoneum

It is the inner most layer of the abdominal wall. The peritoneum provides little strength in wound closure but it affords remarkable protection from infection if it remains unviolated.

Functions of abdominal muscles

1. The abdominal muscles protects and restrains the abdominal viscera, and assists in expelling air during expiration (also faeces, urine or a fetus)mainly due to oblique and transversus muscles.

2. Rotating upper body against the lower body.

3. The paired rectus abdominis muscles are the most effective ones for anterior flexion of the body and are important in rising out of bed and climbing.

Arterial supply

1. The internal mammary artery through the upper rectus abdominus muscle to the upper central abdominal structures.

2. The segmental thoracic and lumbar intercostal arteries from the sides between the external and internal oblique muscles with direct lateral skin perforators.

3. The external iliac artery giving off the deep inferior epigastric artery to the lower rectus abdominis muscle and skin, and the deep circumflex iliac artery supplying the inner aspect of the ileum and terminating in the skin over the iliac crest.

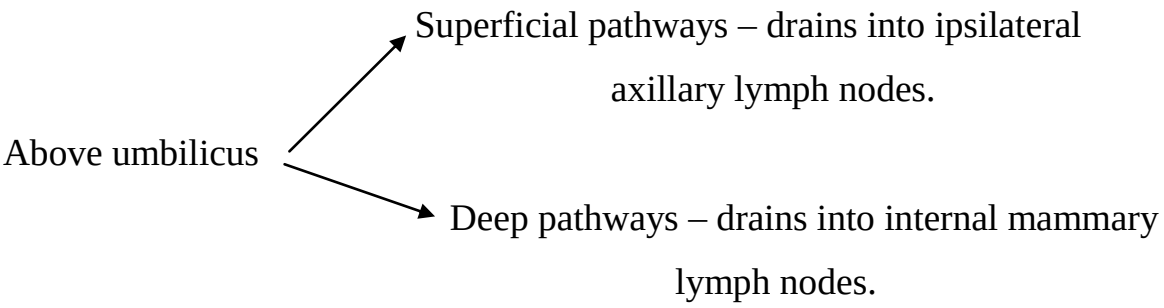
4. The femoral artery giving off the superficial inferior epigastric artery to the lower abdomen and the superficial circumflex iliac artery to the anterior iliac spine area.

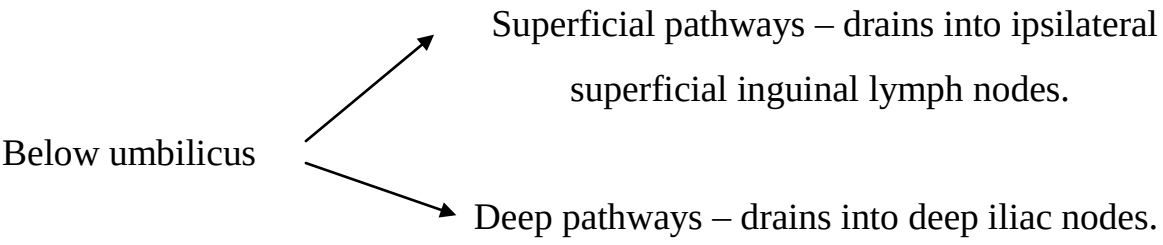
Nerve supply

• Anterior rami of thoracic nerves T7-T12

• Iliohypogastric and ilioinguinal nerves of the anterior abdominal wall.

Lymphatic drainage





ETIOLOGICAL FACTORS FOR INCISIONAL HERNIA

Preoperative factors

Obesity, malnutrition, advanced age, malignant disorders, jaundice, diabetes mellitus, renal disorder, smoking, ACTH and steroid therapy hypothyroidism.

Peroperative factors

- Type of operation
- Type of incision
- Suture material used
- Suture techniques
- Use of drainage tube

Postoperative factors

- Wound infection
- Postoperative pulmonary complications and increased intra abdominal pressure
- Collagen abnormalities
- Ageing

PRE-OPERATIVE CAUSES[13,14]

1. Obesity:

It is associated with high percentage of postoperative hernia as well as recurrence following repair of these hernia (3 fold increase) by

- Increased intra abdominal pressure
- Stretches abdominal wall
- Fat is hard to suture, tends to bleed
- Easily breaks down, inhibits wound healing, and raises infection rate

2. Diabetes Mellitus:-

- Decreased inflammatory response
- Increased wound infection rate

3. Smoking:-

- Inactivate antiproteases, so protease and elastase
- destroy collagen and elastin of rectus sheath and ransversalis fascia leading to hernia formation.
- Postoperative atelectasis - Pulmonary infection- Cough– Hernia.

4. Steroid Therapy:-

Inhibit fibroblasts, capillary proliferation and decreases the inflammatory response resulting in impaired formation of granulation tissue leading to incisional hernia.

5. Malnutrition:-

a. Hypoproteinemia

b. Anemia

Delivery of blood and oxygen are inadequate - so poor wound healing.

c. Ascorbic acid deficiency

Inhibition of collagen synthesis leads to abnormal formation of fibers and formation of incisional hernia.

6. Multiple pregnancies:-

There is increased incidence of incisional hernia in multiparous women compared to others.

PER-OPERATIVE CAUSES

1. Nature of Surgery:

Emergency or elective laparotomies for peritonitis, appendicitis, Diverticulitis, acute pancreatitis and intestinal obstruction are associated with higher incidence of incisional hernias.

2. Type of Incision:

Mid line incision – 70%

Transverse incision – 12% (If they cross linea alba)

Oblique incision – 12%

(Cholecystectomy, nephrectomy &appendicectomy)

Vertical incision:

Para Median / Lateral paramedian has decreased the number of incisional hernia because of wide shutter mechanism.

Lower midline is associated with more incisional hernia than upper midline incision.

1. Because of the absence of posterior rectus sheath

2. Greater effect of gravity on the lower abdomen.

Pararectus incision:

Divides the intercostal nerves and vessels leading to weakness and increased incidence of hernia formation.

Transverse incision:

Suture closure places suture materials around fascial fibers. On contraction the fibers are opposed and the suture material would realize minimal laterally directed tension.

Oblique incision:

When the intercostal nerves are damaged as in case of sub costal incision and for renal exploration, the muscles atrophy and predispose to hernia formation.

3. Suture Materials:

Mechanism of wound healing is important to know the importance of suture materials and its prevention of incisional hernia.

There is no tensile strength in the wound during the first week.

Rapid increase in strength of the wound in 70 days after surgery.

Maximum strength of the wound is attained in one year. The original strength before surgery can never be attained.

So during early phase of wound healing suture material does, in fact play an important role in maintaining the integrity of the wound closures and there is no role for absorbable suture materials (catgut, polyglactic acid)for abdominal wall closure.

Ideal suture material

Non absorbable, monofilament with retention of high tensile strength. Monofilament are inert and doesn't act as a site for infection.

4. Technique of wound closure[12]

a)

Mass closure	**Layered closure**
Wide bite a minimum 1cm from the wound edges and placed at an interval of 1cm is ideal	Too many sutures lead to strangulation & necrosis compared to mass closure

b) Continuous Vs interrupted

Continuous suture disperses suture tension along the length of incision.

Interrupted sutures – tension is different at each suture that may led to fascial necrosis if tied too tight and poor approximation if tied too loosely.

Length of Suture material:

According to Jeinke's formula for ideal closure of the abdominal wound without tension and risk of wound dehiscence or incisional hernia, the length of suture material should be at least four times the length of wound (4:1).

5. Hematoma:

It acts as a nidus of infection that in turn increases the incidence of incisional hernia. Dead space drainage and obliteration of dead space prevents any collection and decreases wound infection.

6. Wound tension

Wound tension is one of the factor which decides fate of wound healing. Excessive wound tension leads to ischemia and necrosis which leads to hernia formation

7. Drainage tube

Abdominal drain through the main wound increases contamination and infection.

POSTOPERATIVE CAUSES

1. Wound infection

It is the most common factor suggested by many authors. It acts by release of collagenases, fibrinolysins, hemolytic and coagulase enzymes.

Bucknall and colleagues in their study found that the presence of wound infection was associated with fivefold increase in the rate of developing hernia (23%) compared with uninfected wound (4.5%).

2. Postoperative pulmonary complications

Conditions which increase intra abdominal pressure in the immediate postoperative period like consolidation, pulmonary embolism, obstructive lung diseases and restrictive lung diseases.

3. Collagen abnormalities:

Diseases like Ehler Danlos disease, Marfan's syndromes are likely to suffer from multiple hernias and also at multiple sites.

4. Ageing

Ageing and weakness of tissues and the increased intra abdominal pressure associated with chronic cough, constipation and prostatism areproposed etiological factor for the onset of incisional hernia in later age group.

HYPOTHESIS OF INCISIONAL HERNIA FORMATION

URSHEL AND CO

Fascia under stress has increased DNA and protein by fibroblast and these continue for a long time.

Phases of wound healing

1. Substrate phase

1-4 days – Exudative / Inflammatory

2. Fibroblastic phase

5-20 days – Proliferative phase, connective phase, incremental phase

3. Differentiation phase

21st day up to years – remodeling, resorptive or plateau phase.

Possible interruption of the process at a time remote from the apparent healing of wound may lead to fascial weakness.

Early fascial separation may be predictive of incisional hernia. Metal clips placed on either side of fascia and abdominal radiography done at one month showed that patients who developed incisional hernia post operatively, had demonstrable separation more than 12 mm compared to others.[9]

CLINICAL MANIFESTATIONS

Among abdominal wall hernias the incisional hernia is the one to which the patient most frequently visits the surgeon.

The usual complaint is of a swelling in the vicinity of the healed scar.

If omentum or even preperitoneal fat herniates through small defect, the patient may experience pain and vague discomfort aggravated by coughing and straining.

Generally other symptoms attributable to the incisional hernia are

caused either by incarceration of one or several viscera. There is often a history of repeated mild attacks of incomplete obstruction manifesting as colicky pain and vomiting.

Intestinal obstruction may be the presenting complaint in older patients with neglected incisional hernias.

If the hernia strangulates, the symptoms of intestinal obstruction and ischemic bowel will supervene. Blunt trauma to the abdomen may precipitate intestinal injury if the hernia contains incarcerated loops of intestine. In the secases early laparotomy is mandatory (Lancet Editorial 1969)

Rupture of large incisional hernias is uncommon but is encountered occasionally (Hamilton, 1996). In large lower abdominal midline dependent

incisional hernias, areas of skin may undergo pressure ischemic necrosis and may ulcerate and rarely the hernia may rupture and even frank evisceration, may occur.

Past History

Initial operative procedure, complications following initial operations, time of onset of incisional hernia, number of laparotomies and organ operated should be sought for incidences of incisional hernia in different operations.

In Ponka's series of 794 cases of laparotomies, operations on female pelvic organs are the most frequent antecedent procedures. It is due to the fact that operations on the female reproductive tract are so common.

Physical examination

Age - An increase of incisional hernia is noted in patients over age 60. Incisional hernia is more common in 5th, 6th and 7th decades.[1]

Sex – More in females due to more surgeries on the female reproductive organs.

Obesity – Incidence of incisional hernia and recurrence rate following repair of incisional hernias are much higher for obese individuals.[1]

Local examination

The size of the hernia itself can be best assessed with the patient standing and coughing, but more important is the size of the defect, which should be examined with the patient supine. The examiner's hand, with fingers straightened, is inserted into the defect, and the patient is requested to raise his head and shoulders forwards without the aid of his hands.

Complete per rectal and per vaginal examination done to rule out co-existing abdominal pathology.

Diagnosis

The scar of the original surgery is always identifiable over the swelling. In a large incisional hernia the diagnosis is obvious.

However, in certain cases, ultrasonography, CT scan or both have be enutilized to distinguish hernial defects from other abdominal wall processes that may present as mass lesion or be the source of pain syndrome.

OPERATIVE METHODS OF REPAIR

Three basic methods have emerged for repair of these distressing hernias.

1. anatomical repair (resuturing)
2. Shoelace darn repair

3. Synthetic non absorbable mesh closure

The method chosen depends largely on the size of the hernial defect.

A small defect (< 2 cm) is one in which the musculoaponeurotic edges come

together or almost do so and which is suitable for closure by resuture.

Hernias with a wider defect (< 2 cm) also can be conveniently repaired by the shoelace darn technique.

The third method for repair of these hernias involves the use of sheets of woven or knitted mesh of synthetic non absorbable materials such as polypropylene, polyester, or sheets of expanded polytetrafluroethylene (ePTFE) placed across the defect and stitched to the abdominal wall. The most common and most favoured material today is knitted polypropylene.

ANATOMICAL REPAIR

The operation is best done with the patient under general anaesthesia with good relaxation. The old scar is excised in an elliptic fashion and is carefully separated from the hernial sac. The skin on each side of the incision then is further freed to expose the complete sac down to the musculoaponeurotic borders of the hernial defect and part of the abdominal wall beyond it. The sac is opened, and all adherent omentum and loops of bowel are dissected off its inner surface and also of the inner surface of the

abdominal wall or a few centimeters on each side of the defect, remembering that it is better to leave bits of sac wall or peritoneum adherent to the wall of the freed bowel rather than to leave bits of the lining scar tissue, and old suture material are excised up to the edge of the hernial defect to expose the normal tissues of the linea alba.

A heavy monofilament polypropylene (size 1) thread is commonly used. A continuous heavy monofilament polypropylene mass closure is used, taking large bites. The excess skin and subcutaneous tissue is excised, and the wound is closed over the repair with automatic staples or with fine monofilament sutures.

MODIFIED MAYO TECHNIQUE

In which fascia edges were overlapped, typically provided a satisfactory outcome.

SHOELACE DARN REPAIR:

In which relaxing incisions are made in the lateral aspect of the anterior rectus sheath. This allows the medial aspect of the anterior sheath to be approximated in the midline and it is especially useful for large upper midline hernias. This method is based on the fact that strong posterior rectus protects the potential for hernia formation in the area of relaxing incision.

Next step is to reconstitute the strong new midline which will anchor the flat muscles by reconstructing a new linea alba, which can be done by suturing together a strip of fascia from the medial edge of each anterior rectus sheath. The second step is to restore the recti muscle back to their former length by drawing closer together the lateral cut edges of the anterior rectus sheath where medial strips were split off. This step is accomplished with a continuous suture of heavy monofilament nylon that passes to and fro between the cut edge and that also substitutes functionally and anatomically for missing anterior rectus sheaths.

PROSTHETIC MESH REPAIR

The use of sheets of non absorbable synthetic mesh prosthesis placed in abdominal wall defects has revolutionized the repair of incisional hernia and rendered obsolete most of the older types of surgeries.

CHOICE OF MATERIAL

The ideal is the one that is cheap and universally available, is easily cut to the required shape, is flexible, slightly elastic and pleasant to handle. It must be inert and elicit little tissue reaction and consequently, not rejected, even in the presence of infection. It must be sterilizable and noncarcinogenic.

1. Polypropylene mesh (Prolene, Marlex) meets the requirements of the ideal prosthesis and today it is the most commonly used

material for repair of all types of hernia. It consists of a monofilament thread of polypropylene, knitted in a fairly loose manner. For all these reasons, polypropylene knitted mesh has become the standard by which all other prosthetic meshes must be measured.

2. The next most popular prosthesis is also knitted mesh but has a multifilament polyester fiber thread (Dacron, Mersilene). This is an excellent material and cheap. Because of its softness, it easily conforms to all shapes and surfaces without any tendency to recoil. For the sereasons, the knitted polyester mesh is particularly suitable for the Rives Stoppa procedure.

3. Another synthetic material available, although less commonly used, is expanded polytetrafluoroethylene (ePTFE, Teflon, Gore–Tex). This material is successfully used for vascular prosthesis.

TYPES OF OPERATIONS

Many variations and combinations of mesh repair have been described.

1. Intraperitoneal mesh

A piece of mesh cut to the shape of defect, but slightly larger, may be sutured in place, deep to the peritoneum.

2. Inlay mesh

A piece of mesh cut to the size and shape of the defect may be sutured as an inlay graft to the edges of the defect.

3. Onlay mesh

A larger piece may be used as an on lay graft on the anterior rectus.

4. Rives-Stoppa technique

An excellent method which has been popular in France for some years now, is the Rives-Stoppa technique of placing the sheet of prosthetic mesh in the place between the posterior rectus sheath and the rectus muscles. This has distinct advantages over the intra peritoneal, inlay or overlay methods.

TECHNIQUE OF ON LAY REPAIR

PRINCIPLES OF REPAIR[10,13]:

No Tension:

Tension in a hernia repair is the principle factor in failure of wound healing due to the formation of thin scar that does not adequately resist increased intra abdominal pressure.

Bowel should not be exposed to the synthetic mesh:

Synthetic mesh incites an intense inflammatory reaction that mature as dense sheet of scar and if bowel is exposed to prosthesis it becomes densely adherent and predisposes to obstruction.

Antibiotic prophylaxis and preoperative preparation:

The presence of the prosthesis within a wound disables normal host defense mechanisms that protect against the low level of bacterial contamination that occurs with every surgical wound – to combat this problem, Cefotaxime 1gm is administered intravenously about 30 min before the skin incision.

Urinary bladder has to be catheterized and gastric intubation done.

Most of the patients were operated under spinal anesthesia and the rest under general anesthesia.

Incision

Elliptical incision given excising the previous scar.

Excision of sac:

Skin and subcutaneous flaps dissected and the peritoneal sac defined all around. The peritoneal sac opened and the adhesions present were

released. Excess sac was excised and peritoneum closed in the midline with absorbable suture materials.

Dissection of flaps:

Skin and the subcutaneous tissues overlying the hernial sac are initially dissected in the plane external to the sac and deep to the subcutaneous fat until the musculofascial border of the hernia were reached. The dissection is then continued on the surface of the fascia elevating the overlying skin and fat to a length of 5-8 cm from the margins of the hernial orifice.

Midline defect in rectus sheath closed with 1- prolene suture material in continuous manner without tension.

Placing of prosthesis

Polypropylene, monofilament knitted mesh about 15 x 15 cm used for repair is kept over the sheath without tension and excessive folding.

Fixation of mesh

After placing the mesh over the rectus sheath, it is fixed using 2-0 prolene around 1cm form its edge with the rectus sheath. Two closed suction drains are placed over the mesh and fixed with the skin.

Postoperative period

- Oral fluids started after return of bowel movements
- Foleys catheter removed on first postoperative day and mobilization of the patient done on the same day.
- Serial recording of the drainage done and suction kept until the drainage collection is nil.
- Suture removal is done usually on the 10th day and if wound found healthy patients were sent home and the average duration of stay was 7 days.

TECHNIQUE OF RETROMUSCULAR PREPERITONEAL PLACEMENT OF MESH[10]

In this technique mesh is placed in the preperitoneal plane behind the rectus muscles and laid onto the anterior aspect of the peritoneum.

Figure 2: Incisional Hernia

Steps:

1. The preperitoneal plane is separated by dissecting the peritoneum from the rectus muscles.

2. Sheet of knitted, braided polypropylene mesh (Mersilene, Dacron) longer and wider than the length of the defect is selected.

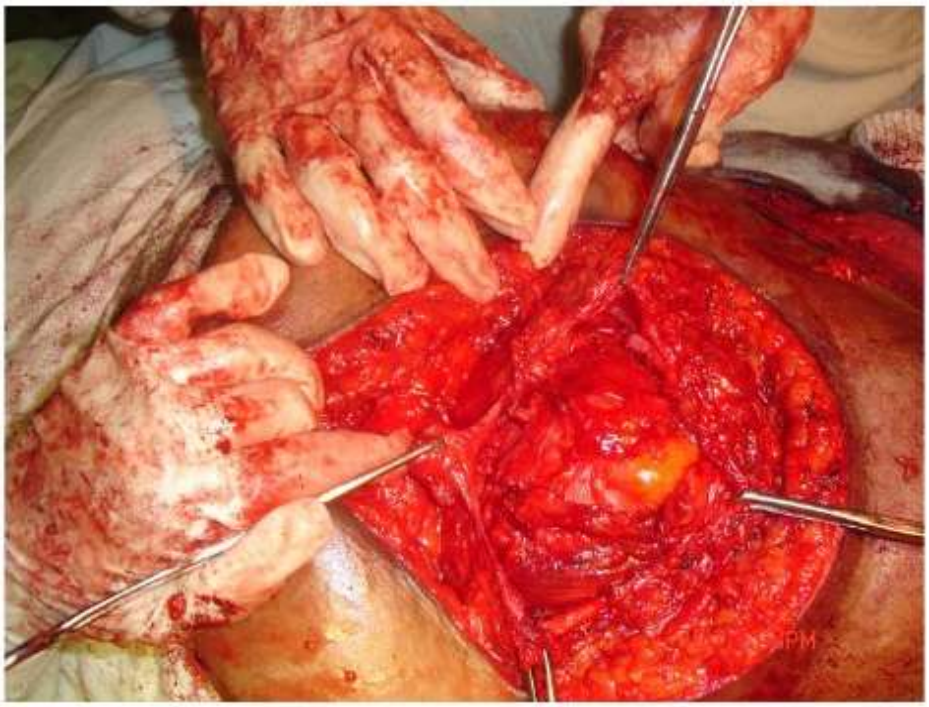


Figure 3: Dissection of Hernial Defect and Preperitoneal plane

3. Mesh is placed on the closed peritoneum in the plane behind the rectus muscles.

4. The mesh is fixed to the peritoneum using 2-o polypropylene sutures.

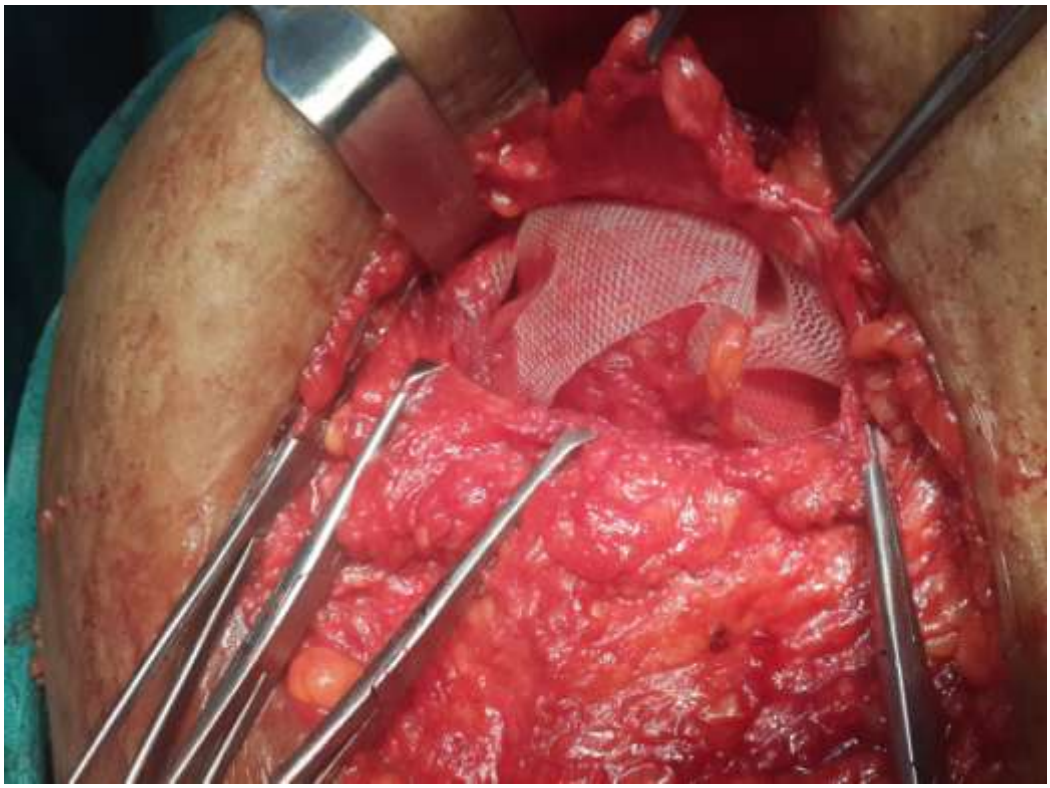


Figure 4: Mesh Placement on the Peritoneum

5. When the hernial defect reaches the upper part of abdominal wall, upper edge of mesh is passed down to lie under the diaphragm.

6. In lower abdomen below the arcuate line, it lies in the preperitoneal plane and should be long enough to be laid into the pelvis, and fixed back to pubis, and along the pectenial lines.

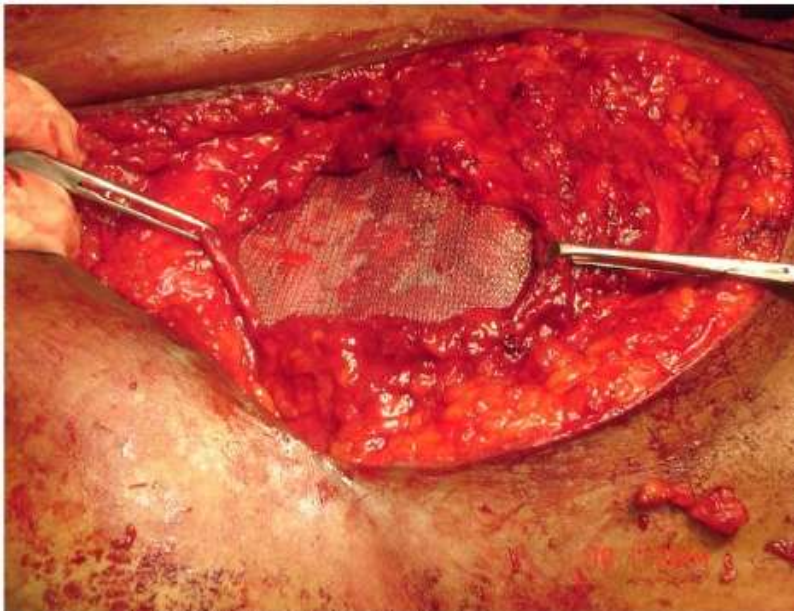


Figure 5 : Mesh Fixed to Peritoneum

7. Two suction drains are laid on the mesh and brought out. The rectus sheath is then sutured together along its cut medial edges with non absorbable monofilament(1-o prolene) suture.

Figure 6 : Suction Drain Placed over the Mesh

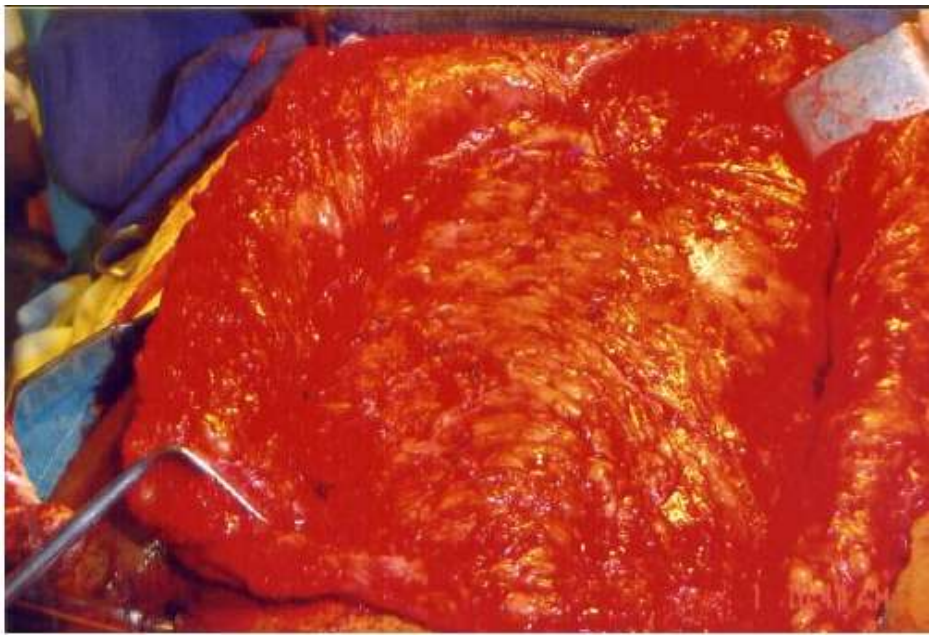


Figure 7: Closure of Anterior Rectus Sheath

Advantages

1. Mesh is held in place by the natural forces of the intra abdominal pressure against the abdominal wall.

2. Avoids slippage and recurrent hernia between mesh and edge of the defect.

Studies

1. Open Rives – Stoppa ventral hernia repair.[10]

Hearts till L, Richards ML et al Department of surgery, university of Texas health science center at SanAntonio.

Study – 81 patients were taken up for Rives – Stoppa repair of whom

54% were recurrent

37% were incarcerated

42% had multiple defects

Follow up : Average 30 months

Conclusion : Recurrence rate 10%

No correlation between hernia recurrence and

- Age
- Gender
- BMI
- Hernia size
- Nature of prior repair

2. Comparison of repair techniques for major incisional hernias

Demanian GA, Denham W

Department of plastic surgery, Department of surgery. IL

Conclusion: No one technique is the “best” procedure for all patients.

3. Rives-Stoppa procedure for repair of large incisional hernias:

Bauk JJ, Harrin MT et al

Department of surgery, Mt Sinai School of Medicine, Mt Sinai Hospital,New York.

Study	:	57 patients for 6 year period of whom 15 were recurrent.
Follow up	:	34.9 months
Results	:	No recurrences, GI complications, fistula or death. 2 patients had wound infections
Conclusion	:	It gives excellent long term results and minimum morbidity.

LAPAROSCOPIC INCISIONAL HERNIA REPAIR

Abdomen is entered through an area away from the hernia by means of one of the two techniques, closed or by open method. Adhesions are released to free anterior abdominal wall.

Margins of hernia are delineated and cleared circumferentially, about a distance of atleast 4cm. Hernial sac contents reduced, peritoneal sac itself was left in situ, ePTFE mesh tailored to overlap all hernia's by a

margin of 3cm to 4cm and introduced through 10 mm trocar site and positioned.

PROBLEMS OF MESH IN VIVO

I. SHRINKING OF POLYPROPYLENE MESH

Mesh that contains a lot of polypropylene content have a tendency to shrink post operatively so that is requires at least 3cm overlap from the hernia defect to prevent recurrence.

II. FIXATION OF MESH

Herniation pressure, hydroxylproline concentration, mesh shape and number of fibroblasts, collagen fibers of tissue all act as an anchor zone. But ideal and accepted method is fixation of mesh with non- absorbable sutures with 1cm gap between two sutures.

III. PREVENTION OF ADHESION

Prevention of adhesion formation with sodium hyaluronate based bioresorbable membrane.

POSTOPERATIVE MANAGEMENT AND POSTOPERATIVE COMPLICATIONS

Post operative management

The ambulation will be started on the evening of the operation and breathing exercises started. Nasogastric tube and intravenous infusion can be removed on the next morning and the patient is encouraged to walk and to eat and drink normally. Active movements of the chest and limbs are encouraged from the beginning.

Body temperature is monitored. Persistent fever beyond 4th post-operative day indicates suppuration.

Drainage tubes can be removed after 3-5 days. This depends on the amount of discharge and degree of obesity of the patient. Sutures are left preferably up to 10-15 days.

If the patient is an office worker, he can return to work at any time he feels comfortable. Patients are advised to avoid unusually excessive physical effort for 3 to 6 months. Sexual intercourse should be abstained for a month or more after operation.

POSTOPERATIVE COMPLICATIONS[14,23]

A. IMMEDIATE COMPLICATIONS

I. GENERAL COMPLICATIONS

1. Mortality:

0.6 – 1.2%: It is usually due to respiratory failure and associated cardiac illness**.**

2. Gastrointestinal complications - paralytic ileus:

Ileus may result after repair of large incisional hernia due to mobilization and excessive handling of intestines. Increased stress upon a healing wound may result in recurrence of hernia. When there is a postoperative distention and paralytic ileus, gastric aspiration and intravenous fluids are necessary.

If the patient is nauseated, he should have nothing by mouth until nausea ceases. Often on the third postoperative day in the uncomplicated case, to avoid excessive straining at defaecation, it is necessary to give a mild purgative.

3. Pulmonary complications: 1%

Respiratory tract diseases places increased stress on the suture line by increasing the intra- abdominal pressure. Allergic conditions causing

coughing or sneezing should be properly treated. These complications can be prevented by providing respiratory therapy for 12 –24 hours or even longer.

4. Urinary Complications

After operations on lower abdominal incisional hernias, often the patient will have retention of urine. Catheterization of the bladder with an indwelling Foley's catheter obviates these complications.

5. Thrombophlebitis: 1%

When the contents of the massive hernial sac are reduced into the abdominal cavity, the increase in intra- abdominal pressure causes venous hypertension in the lower extremities, presumably with an increase in incidence of deep vein thrombosis in lower extremities. This can be prevented by low doses of anticoagulant therapy continued until the patient can walk and is ready for discharge. Active limb movements in early postoperative period is also helpful.

II. LOCAL COMPLICATIONS

1. Seroma

The development of a chronic seroma is a common complication. A recurring accumulation of serum in the abdominal wall usually calls for repeated needle aspirations and the external application of mild pressure.

2. Haematoma : 4.5%

Small haematomas need not be disturbed. But the blood outside the vascular system is a type of necrotic or dead tissue. So, any large haematoma should be debrided or evacuated as in any other devitalized tissue.

3. Wound Infections

a. Minor infections 5.1%

These are superficial infections associated with minor skin loss at the margins of the wound.

b. Major infections 0.75%

These are suppurations, which occur in the depth of the wounds. These patients will be ill with fever and chills and leukocytosis accompany the onset of infection. Drainage of the wound is essential. Culture and sensitivity should be obtained. Antibiotic irrigation may be used. Systemic antibiotics are essential.

c. Cutaneous gangrene 1.2%

4. Wound induration

When mesh is used, a small number of patients will have pain and induration in the operated area. Reassurance and analgesics are helpful. The pain usually diminishes.

5. Abdominal wall sinuses

As a result of infection in wounds containing foreign bodies, persistent draining sinuses are frequent. The sinuses may be due to infection in sutures or infections in sheets of implanted materials. Many draining sinuses will respond to drainage, irrigation, compression and antibiotic therapy.

Jacobs and colleagues, (1965) reported an infection rate of 20% and seroma in 45 patients who underwent mesh repair for incisional hernia. This is higher than the Usher reports of 6.3%.

In employing Teflon mesh for the repair of 25 incisional hernias, Gibson and Stafford (quoted by R.S. Smith, 1971) had a 50% incidence of wound complications. In more than 2000 incisional hernia repairs, by Preston and Richards (1963) the incidence of infection was 0.1.

B. LATE COMPLICATIONS

1. RECURRENCE[16]

Herniorhaphy as a planned procedure may be carried out in patients above 70 years with minimum morbidity and mortality.

In Larson's series of 53 patients with prosthetic incisional hernia repair, removal was not necessary. Hamilton used free fascia lata patches to repair 47 large or different hernias (43 incisional and 4 groin) over a 21 years period. In this group there were 3 recurrences.

R.S. Smith used Tantalum mesh for hernia repairs. He noted 12 recurrences in Tantalum mesh and 1 recurrence in Marlex mesh group.

In M.J. Notras (1974) series of 32 prosthetic repairs of incisional hernia, there were no recurrences.

Recurrence rate for the repair of incisional hernia

Author	Types of repair	No. of cases	Recurrence	Percentage
Rodney Maingot	Keel repair	115	5	4.3
Abroahamson	Shoelace repair	300	6	2.0
Adloff and Arnaud	Mersilene mesh intraperitoneal	130	6	4.5
Usher	Two layer Marlex	96	10	10.4

2. Late infection

It largely depends on the type of prosthetic material used.

3. Recurrent seromas

There are multilocular cystic masses on the site of treatment of larger incisional hernias. They appear more frequently after placement of on lay prosthesis. It requires further surgery for excision of seroma.

4. Digestive migrations

These occur more often after the placements of prosthesis in intra abdominal site. It is intra luminal migration of prosthesis. They must be differentiated from intestinal fistulas occurring following incisional hernia repair using prosthetic material, with suppuration and postoperative disunion.

PROSTHETIC MATERIALS FOR INCISIONAL HERNIA REPAIR

HISTORICAL DEVELOPMENT

Biomaterials are sometimes required to bridge or reinforce natural and unnatural defects over abdominal wall, inguinal canal and also chest wall.

They may easily be classified into;

a. Natural prosthetic biomaterials

b. Metallic synthetic biomaterials

c. Nonmetallic synthetic prosthesis

PROSTHETIC NATURAL BIOMATERIALS

- Autogenous dermal grafts
- Dermal Collagen Homografts
- Autogenous fascial heterografts

• Preserved dural homografts

• Whole skin grafts

• Porcine dermal collagen

• Lyophilized aortic homografts

• Bovine pericardium

Some of these were used with fairly successful results, but their scarcity and in many cases, cost, limited its use.

METALLIC SYNTHETIC BIOMATERIALS

Use of metallic synthetic biomaterials predated development of natural implants.

• Silver filigree

• Tantalum gauge mesh

• Stainless steel mesh

But these were difficult to fondle in surgery and were associated with poor resistance to infection leading to frequent abscess formation and recurrent herniation.

1. Silver Filigree

Lack of pliability, tendency to become hardened by work, accumulation of fluid around the material, wound infection and the subsequent sinus tract prevents its use in management of hernia.

NON METALLIC SYNTHETIC PROSTHESIS

i) Nylon mesh

ii) Silastic

iii) Polytetrafluroethylene

iv) Carbon fiber

a. Nylon mesh

Unreliable in infection, has poor fibroblast ingrowth loses its strength due to hydrolysis and chemical denaturing in vivo.

b. Silastic

Mainly used in pediatric repair of omphalocele and gastrochisis.

Adequate fibrous tissue ingrowth was one of its advantages.

c. Polytetrafluroethylene

Not incorporated well into body tissue and not tolerant to infection.

d. Carbon fiber

Advantages include biocompatibility and formation of new connective tissue similar to ligament.

CURRENT SYNTHETIC BIOMATERIALS

a. Polyester mesh

b. Polypropylene mesh

c. Expanded polytetrafluro ethylene mesh

Ideal characteristics of synthetic biomaterials

- No physical modification by tissue fluids
- Chemically inert
- Does not incite intense inflammatory (or) foreign body reaction
- Hypersensitivity
- Non carcinogenic
- Can be fabricated to any form or shape without loss of its strength
- Resistance to mechanical strains
- Can be sterilized by auto claving or disinfectants

POLYESTER MESH (Dacron, Mersilene)

These prostheses are supple and elastic, conform to visceral space, have a grainy texture to grip the peritoneum and prevent slippage, and are sufficiently reactive to induce rapid fibroblast response to ensure fixation.

POLYPROPYLENE MESH (marlex, proline)

Usher and co in 1958 introduced polypropylene mesh in incisional hernia.

The advantages are:

 In purulent infection, granulation tissue grow through the mesh without sloughing or sinus tract formation.

 Inhibit bacterial entrapment

 Tensile strength retained indefinitely

 Soft, pliable and easy to handle

 Can be autoclaved, trimmed in operating room

 Interstices allow for prompt fixation by collagen .

Because of the above nature, polypropylene mesh is the most commonly used prosthesis in incisional hernias.

Disadvantages

Mesh when placed close to bowel can lead to

i. Fistula formation – mesh when in contact with bowel may erode into adjacent bowel and leads to formation of enterocutaneous fistula.

ii. Obstruction

EXPANDED POLYTETRA FLURO ETHYLENE

i. Minimal inflammatory reaction occurred with ePTFE.

ii. It can be placed safely over the bowel without formation of fistula, and obstruction is rare.

iii. Orderly orientation of scar tissue adjacent to the patch.

MATERIALS AND METHODS

The materials for this prospective study of the dissertation were carried out for 50 patients who were admitted in the General Surgical wards at Government Hospital, Coimbatore Medical College, Coimbatore during the period of August 2014 to August 2015. The study comprised of 38 females and 12 males forming a total of 50 patients.

A detailed history has been made and thorough general examination was made and cases were studied as per the proforma attached.

Routine lab investigations of urine and blood and chest screening and ECG were done.

The other things were noted as:

- Type of incision and suture materials used
- Postoperative healing of wound
- Size of detect
- Presence of other predisposing factors like obesity

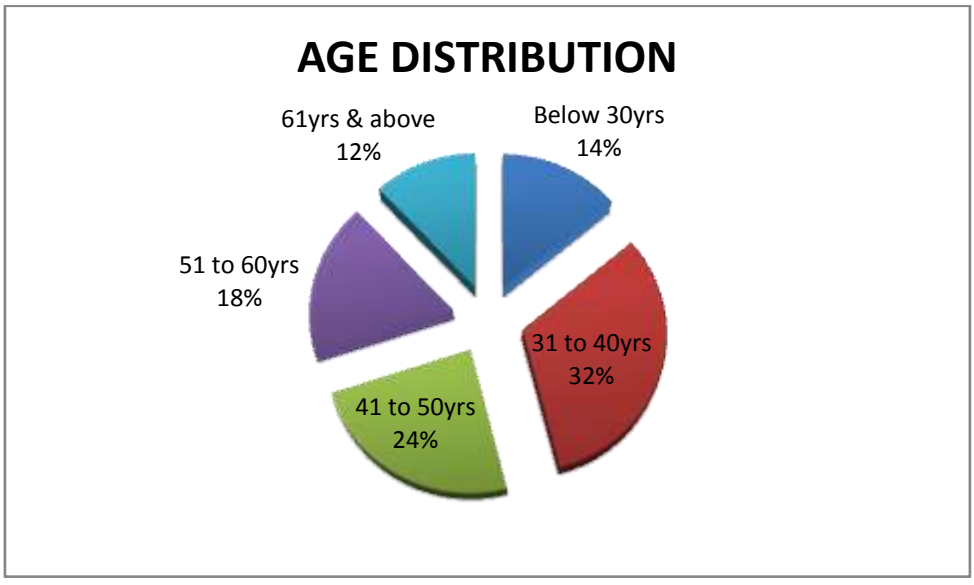
Poly propylene mesh was used in all 50 cases. The patients were followed up for a maximum of one year. Of the 50 cases 22 patients underwent retromuscular preperitoneal mesh placement and 28 patients underwent onlay mesh graft.

OBSERVATIONS AND STATISTICS IN OUR STUDY

TABLE I

AGE DISTRIBUTION

Particulars	Frequency	Percent
Below 30yrs	7	14.0
31 to 40yrs	16	32.0
41 to 50yrs	12	24.0
51 to 60yrs	9	18.0
61yrs & above	6	12.0
Total	50	100.0



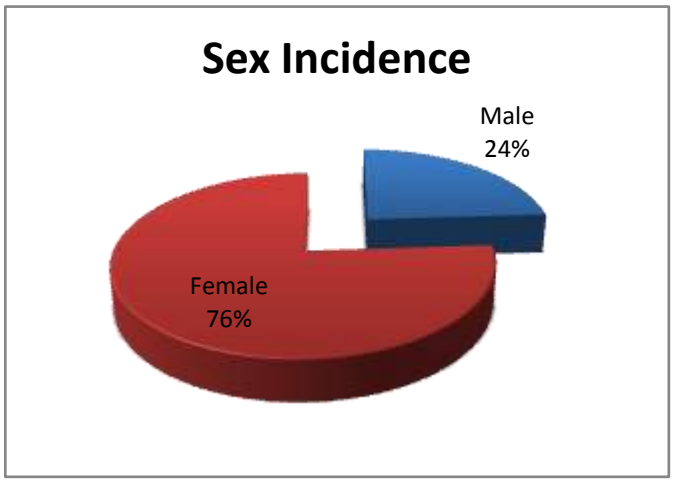
Chi-square test

Age (years)	Onlay		Sublay		Total		Statistical inference
	(n=28)	*(100%)*	*(n=22)*	*(100%)*	*(n=50)*	*(100%)*	
Below 30	**5**	**17.9%**	**2**	**9.1%**	**7**	**14.0%**	
31 to 40	**9**	**32.1%**	**7**	**31.8%**	**16**	**32.0%**	**X^2=2.180**
41 to 50	**5**	**17.9%**	**7**	**31.8%**	**12**	**24.0%**	**Df=4.703>0.05**
51 to 60	**6**	**21.4%**	**3**	**13.6%**	**9**	**18.0%**	**Not Significant**
61 & above	**3**	**10.7%**	**3**	**13.6%**	**6**	**12.0%**	

TABLE II

SEX INCIDENCE

Sex	No. of patients	Percentage
Male	12	24
Female	38	76

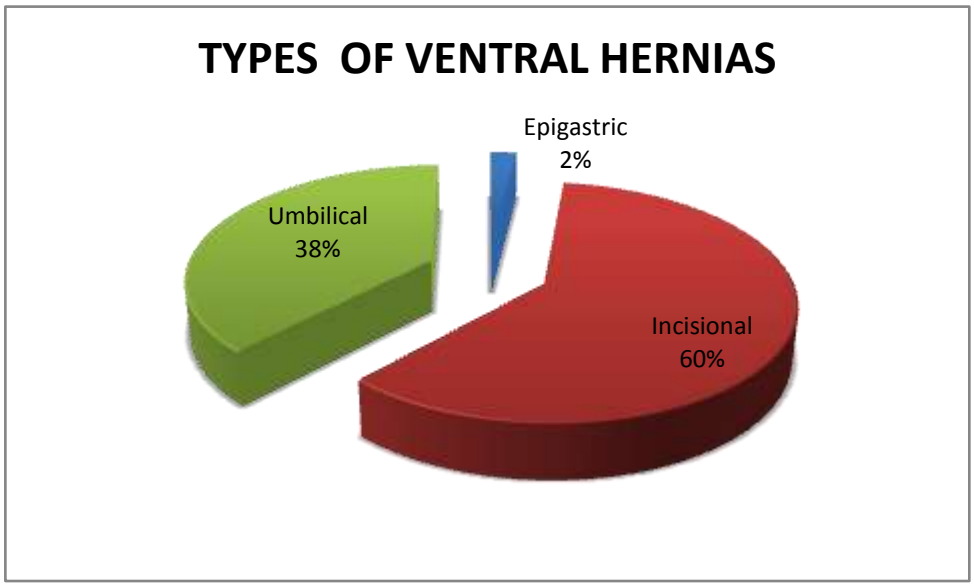


The incidence is more in the female cases than male.

TABLE III

TYPES OF VENTRAL HERNIAS

Particulars	Frequency	Percent
Epigastric	1	2.0
Incisional	30	60.0
Umbilical	19	38.0
Total	50	100.0



INCISIONAL HERNIA

TABLE – IV

TYPES OF INCISION IN PREVIOUS SURGERORY

Incision	Nos	Percent
Lower Midline	16	32
Lower Right Paramedian	8	16
Upper Midline	6	12

Majority of Incisional Hernias occured in patients with Lower Midline and lower Right Paramedian Incisions.

INCISIONAL HERNIA DEFECT SIZE

TABLE – V

Size	Nos	Percent
1 x 1 CM	1	2
2.5 x 2.5 CM	14	28
3 x 3 CM	30	60
3 x 4 CM	5	10

The defect size in umbilical hernias are usually less than 3 x 3 cm.

The defect size in incisional hernias are larger, < 3 x 3 cm.

Presenting complaints

In our study all the 50 patients had bulge. Pain occurred in 22 patients. Skin changes occurred in 1 patient.

Comorbid diseases

Ten patients were diabetic at the time of surgery.

Three patients were hypertensive at the time of surgery.

All cases were subject to routine biochemical and hematological investigations. Radiological investigations including ultrasound were carried out in all cases. Pulmonary function tests were carried out in selected cases who had previous history of bronchial asthma and respiratory disorder.

Complications such as intestinal obstruction and gangrene of small bowel loops were not taken in our case study.

Method of repair

In our study of 50 cases of ventral hernia, 22 patients underwent retromuscular pre peritoneal mesh placement while 28 patients underwent onlay mesh graft.

TABLE VI

DURATION OF SURGERY

The Duration of Surgery is more in sublay groups.

Time(Minute)	Mean	S.D	T	Df	Statistical inference
Onlay (n=28)	57.00	6.182	-7.915	48	.000<0.05 Significant
Sublay (n=22)	68.23	2.742			

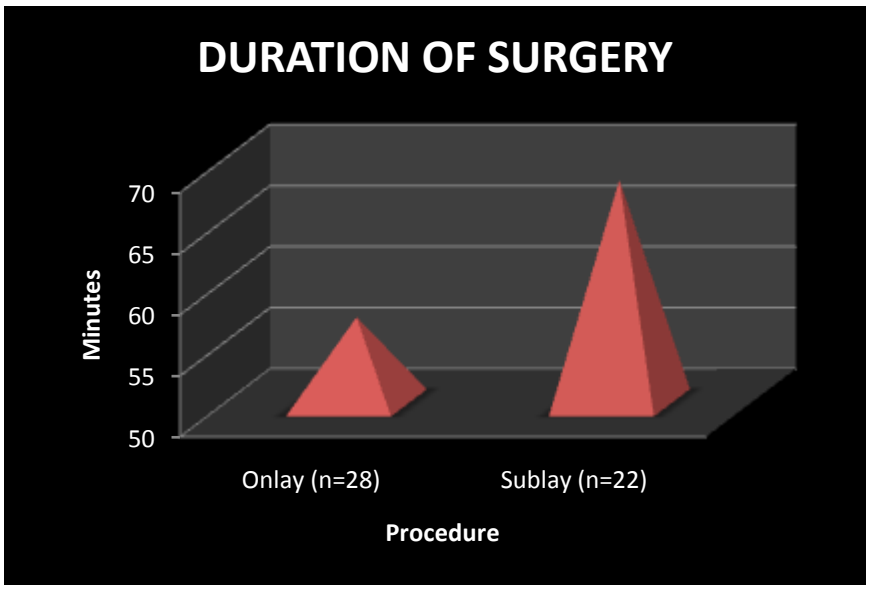
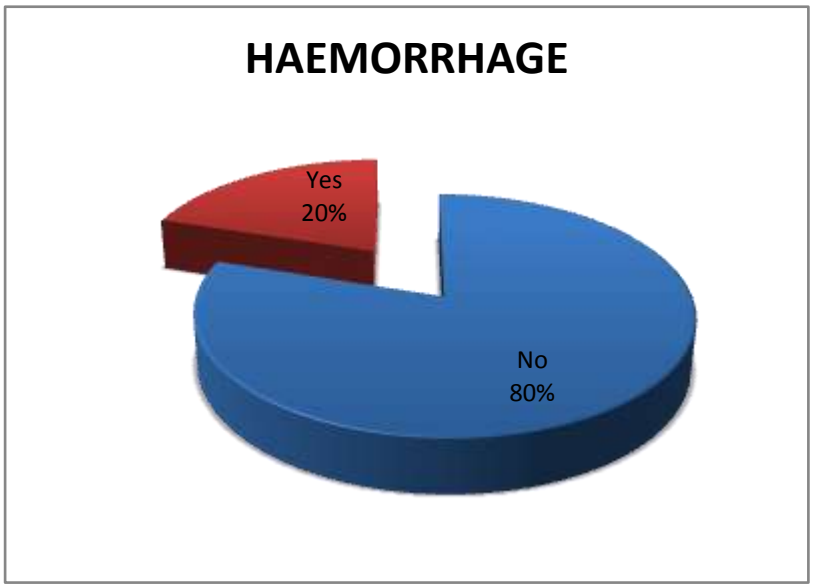


TABLE VII

PEROPERATIVE COMPLICATIONS

Per op (Haemorrhage)

Particulars	Frequency	Percent
No	40	80.0
Yes	10	20.0
Total	50	100.0



Chi-square test

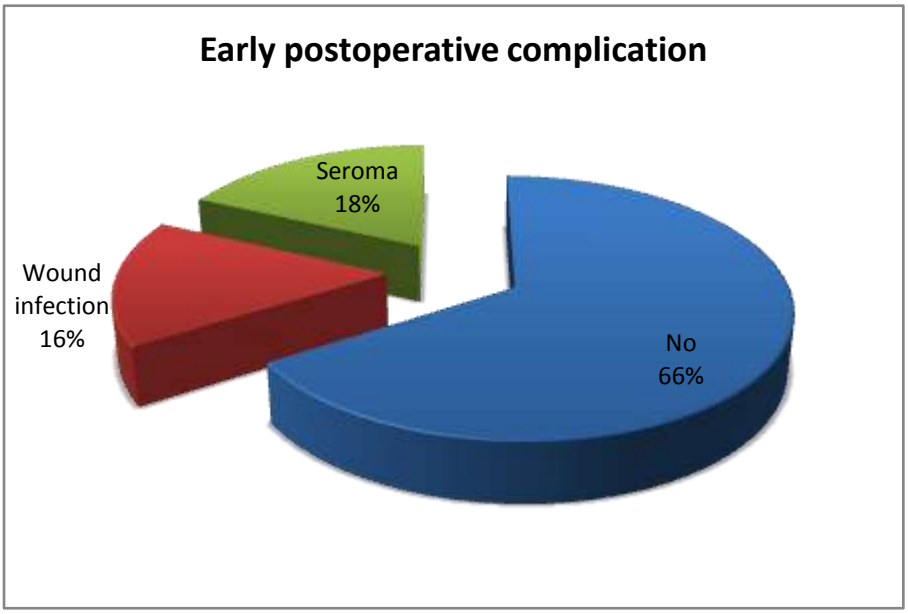
Per op (Haemorrhage)	**Onlay**		**Sublay**		**Total**		**Statistical inference**
	(n=28)	***(100%)***	***(n=22)***	***(100%)***	***(n=50)***	***(100%)***	
No	24	85.7%	16	72.7%	40	80.0%	X^2=1.299 Df=1 254>0.05 Not Significant
Yes	4	14.3%	6	27.3%	10	20.0%	

Incidence of haemorrhage is more common with preperitoneal mesh compared to onlay mesh.

TABLE VIII

EARLY POSTOPERATIVE COMPLICATION

Particulars	Frequency	Percent
No	33	66.0
Wound infection	8	16.0
Seroma	9	18.0
Total	**50**	**100.0**



Chi-square test

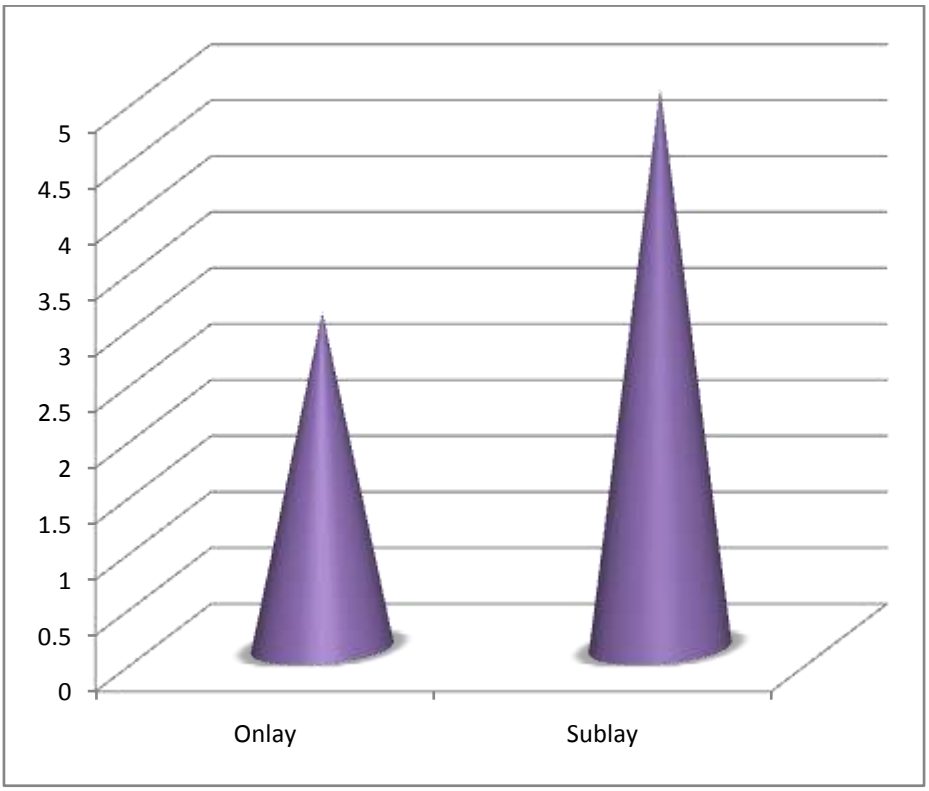
Early Post Op	Onlay		Sublay		Total		Statistical inference
	(n=28)	***(100%)***	***(n=22)***	***(100%)***	***(n=50)***	***(100%)***	
No	14	50.0%	19	86.4%	33	66.0%	X^2=7.422 Df=2 .024<0.05 Significant
Wound infection	7	25.0%	1	4.5%	8	16.0%	
Seroma	7	25.0%	2	9.1%	9	18.0%	

Incidence of wound infection is more common with onlay mesh compared to pre peritoneal mesh.

TABLE IX

POST- OPERATIVE DRAIN REMOVAL

PROCEDURE	DAYS DRAIN KEPT
Onlay	**3**
Sublay	**5**



In the post operative period suction drain is kept for more number of days in the sublay group compared to the onlay group.

TABLE X

DAYS TO DISCHARGE

Days	Mean	S.D	T	Df	Statistical inference
Onlay (n=28)	6.82	.548	-2.235	48	.030<0.05 Significant
Sublay (n=22)	7.18	.588			

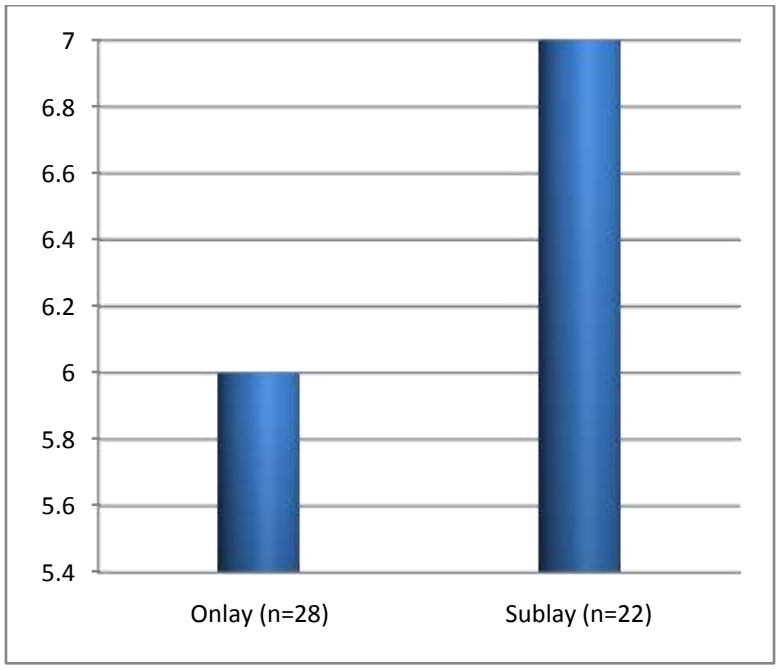
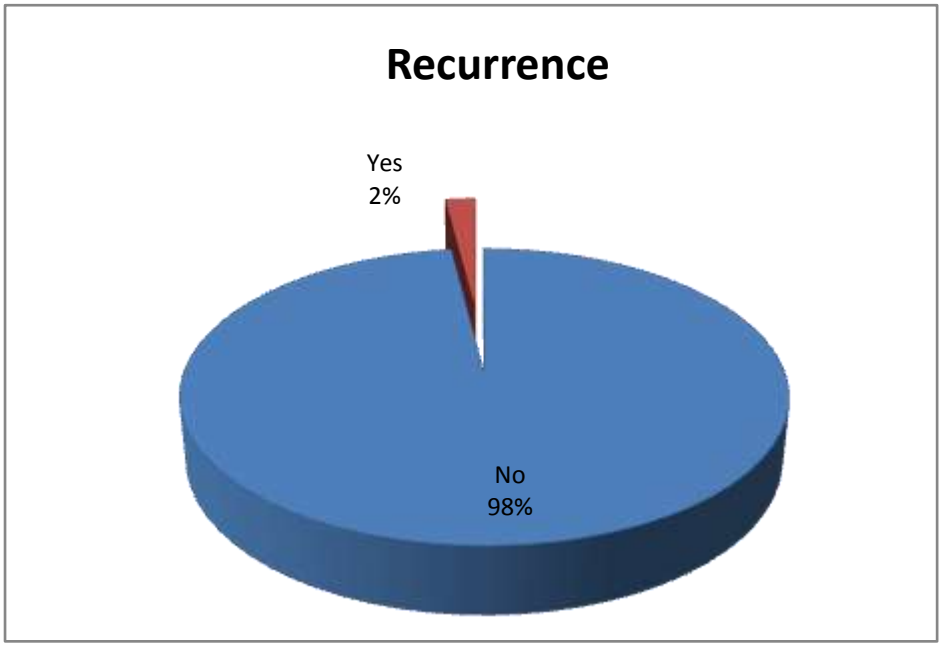


TABLE XI

LATE POSTOPERATIVE COMPLICATIONS (RECURRENCE)

Particulars	Frequency	Percent
No	49	98.0
Yes	1	2.0



Chi-square test

Late Post Op (Recurrence)	**Onlay**		**Sublay**		**Total**		**Statistical inference**
	(n=28)	***(100%)***	***(n=22)***	***(100%)***	***(n=50)***	***(100%)***	
No	27	96.4%	22	100.0%	49	98.0%	X^2=.802 Df=1 .371>0.05 Not Significant
Yes	1	3.6%	0	.0%	1	2.0%	

Incidence of recurrence is more common with onlay mesh compared to pre peritoneal mesh.

DISCUSSION

Ventral Hernias for the purpose of the study includes epigastric, umbilical and incisional hernias. More emphases was laid on incisional hernias. Incisional hernia is due to loss of continuity of fascial closure. It is one of the major complications of laparotomy with an incidence of about 3-11%. There are so many etiological factors for incisional hernia and they should be repaired as soon as they are diagnosed to reduce the complications and reduce the recurrence rate. Defects less than 2.5 cm are closed by anatomical repair and those greater than 2.5 cm are closed with mesh repair.

After the advent of mesh repair the other procedures have become obsolete. Though it is associated with increased incidence of local complications, it reduces the recurrence rate.

The rationale behind using mesh repair invariably for all cases independent of size of defect, age, sex and weight of patient was to reduce the incidence of recurrence.

ONLAY MESH REPAIR:

Onlay mesh repair was done in preference to other procedures because of the following reasons:

Onlay is technically simple and easy procedure compared to others.

No need to dissect in complex areas like preperitoneal and behind the rectus, which leads to hematoma formation and predisposes to wound infection.

Complications like obstruction due to adhesion formation and fistula formation are rare compared to other procedures.

RETROMUSCULAR PREPERITONEAL MESH REPAIR

It is an excellent method (Rives-Stoppa technique) by placing the sheet of prosthetic mesh in the plane between the posterior rectus sheath and the rectus muscles. This has distinct advantages over the intraperitoneal, inlay or overlay methods.

Though it is technically difficult with the higher rate of blood loss it has the distinct advantage of reducing the rate of infection and recurrence.

On the basis of our experience and reports in the literature, the advantage and disadvantages of onlay and prefascial mesh repair has been discussed.

CONCLUSION

1. Use of mesh repair has drastically reduced the rate of recurrence almost to nil in our study patients.

2. Per-operative blood loss was seen in 20% (10) of patients. Of these 7 patients had pre peritoneal mesh placement and 3 patients had onlay mesh repair.

3. Duration of surgery is more in the sublay group (68 minutes) compared to onlay group.

4. Seroma was seen in 18% (9) patients. Of these 7 patients under went onlay repair and 2 patients sublay repair. Seroma was less in the sublay group.

5. Wound infection rate is about 16% (8) in our patients. 7 patients had onlay mesh and 1 patient had pre peritoneal mesh placement.

6. Recurrence was seen in 2% (1) of patients, who had undergone onlay mesh repair.

7. The duration of hospital stay was more in the sublay group.

Mesh repair has become the standard for the repair of all incisional hernias.

Pre peritoneal mesh repair, though technically difficult for the novice, plagued with a higher rate of blood loss has the distinct advantage of reducing the rate of infection and recurrence.

Among the various techniques described in the mesh placement, onlay repair, though technically easier and associated with the lower incidence of blood loss, is complicated by a higher rate of sepsis and recurrence.

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PROFORMA

Name: Age: Sex:

Weight: Para 2 34 5

Occupation – Domestic
Labourer
Heavy labourer

History of present illness:

Hernia – First
Recurrence

Pre operation weight reduction advised – Yes
No

If, Yes , How long?
How Much?

H/o Pul. Tuberculosis
Br. Asthma

Previous surgery - Nature of Surgery
- Nature of Anaesthesia
- Suture material used
- Time interval between surgery & hernia

H/o. Previous wound healing

Normal
Mild sepsis
Severe sepsis

Wound dehiscence

Burst abdomen

Known diabetic patient

Tuberculosis patient

No.of previous operation done

Symptoms

Swelling

Pain - Abdomen

Distension

Bowl habits - Constipation

Vomiting

Personal history

Diet

Smoking

Alcoholism

Menstrual history (in women)

Family history – No. of children and their condition (for women)

G/E: a) Built

b) Anemia

c) Edema feet

d) Any other deficiency disease

e) Overall look – Healthy , Fair, III health

L/E **:** Abd. Flat

Protuberant

Pot belly

Site of Hernia Midline

Lateral

Previous incision URPM, ULPM, LRPM, LLPM,

Upper midline

Lower midline

Transverse incision

Oblique incision

Skin over the Hernia Normal

Unhealthy

Thinned out & papery

Hyperpigmented

Ulceration

Hernia reduces during lying down

Cough impulse present / absent

VIP - Present

Absent

Tenderness - Present

Absent

Size of the hernial sac < 5cm

5-10 cm

more than 10 cm

Size of the defect - < 5cm

5-10 cm

more than 10 cm

H/O suggestive of intestinal obstruction

Pain abdomen.

Vomiting

Constipation

Percussion - Swelling resonant or dull

Auscultation - Over the swelling peristaltic sounds heard or not

Examination of tone of abdominal muscle

INVESTIGATIONS

Routine blood investigations –

ECG –

CXR –

USG Abdomen. –

Anaesthesia: GA Spinal Epidural

Incision

Size of the opening

Sac – thin

Thick

Adhesions - With omentum

With bowel

Mild

Extensive

Omentectomy – Yes

No

Nature of Recti - Normal

Thinned out widely separated

Type of surgery

Retromuscular Pre peritoneal mesh repair

Onlay mesh repair

Suture material

Prolene

Prosthesis used : Polyproplyene

Technical difficulty Bleeding / Raising flaps / Closure

P/O Bladder catheterized: Yes How long?

No

Rylestube aspiration Yes How long?

No

Drainage tube - Corrugated Rubber Drain

Romovac

POST OPERATIVE PERIOD

General complications

Local complications

1. Pain
2. Hematoma
3. Seroma
4. Wound infection: Nil mild
   Severe Wound dehiscence

Sutures removed on 8th day 10th day 12th day

Discharge notes:

- o Date
- o Condition of patient
- o Advice
  - □ Diet
  - □ Nature of operation
  - □ Change of occupation, if any

Follow up

- □ General condition
- □ Bowel habits
- □ Cough
- □ Recurrence of hernia
- □ Any complication

CONSENT FORM

DEPARTMENT OF GENERAL SURGERY

Coimbatore Medical College, Coimbatore

I have been invited to participate in research project titled **"A COMPARATIVE "STUDY ON RETROMUSCULAR PREPERITONEAL (SUBLAY) VERSUS PREFASCIAL (ONLAY) MESH REPAIR OF VENTRAL HERNIAS"**

I understand, it will be answering a set of questionnaire, undergo physical examination, investigations and appropriate treatment. I also give consent to utilize my personal details for study purpose and can be contacted if necessary. I am aware that I have the right to withdraw at any time which will not affect my medical care.

Name of the participant :

Signature :

Date :

ஒப்புதல் படிவம்

பெயர் :

பாலினம் : வயது:

முகவரி :

அரசு கோவை மருத்துவக் கல்லூரியில் பொது மருத்துவத்துறையில் பட்ட மேற்படிப்பு பயிலும் மாணவர் எல்.திலிப் அவர்கள் மேற்கொள்ளும் குடலிறக்க அறுவை சிகிச்சை (**A COMPARATIVE STUDY ON RETROMUSCULAR PREPERITONEAL (SUBLAY) VERSUS PREFASCIAL (ONLAY) MESH REPAIR OF VENTRAL HERNIAS**) சம்பந்தமான ஆய்வில் செய்முறை மற்றும் அனைத்து விளக்கங்களையும் கேட்டுக் கொண்டு எனது சந்தேகங்களை தெளிவுபடுத்திக் கொண்டேன் என்பதை தெரிவித்துக் கொள்கிறேன். நான் இந்த ஆய்வில் முழு சம்மதத்துடன் மற்றும் சுய சிந்தனையுடன் கலந்து கொள்ள சம்மதிக்கிறேன்.

இந்த ஆய்வில் என்னுடைய அனைத்து விவரங்கள் பாதுகாக்கப்படுவதுடன் இதன் முடிவுகள் ஆய்விதழில் வெளியிடப்படுவதில் ஆட்சேபனை இல்லை என்பதை தெரிவித்துக் கொள்கிறேன். எந்த நேரத்திலும் இந்த ஆய்விலிருந்து நான் விலகிக் கொள்ள எனக்கு உரிமை உண்டு என்பதையும் அறிவேன்.

கையொப்பம்/ரேகை

இடம் :

நாள் :

MASTER CHART

S.No	Name	Age	Sex	IP No	Diagnosis	DOS	Procedure	Time (Sec)	Duration of stay (Days)	Complications		
										Per Op	Early Post Op	Late Post Op
1	Mariyadass	49	M	46834	Umbilical Hernia	5.8.14	Sublay	65	6			
2	Sameera	27	F	48270	Incisional	9.8.14	Sublay	70	8	Haemorrhage		
3	Maheswari	45	F	57081	Incisional	17.9.14	Sublay	68	7			
4	Sourana	36	F	60495	Incisional	24.9.14	Sublay	70	7			
5	Sundarasamy	65	M	58236	Umbilical Hernia	2.10.14	Sublay	62	6			
6	Lakshmi	55	F	65775	Incisional	17.10.14	Sublay	68	7		Sup.Sepsis	
7	Sarojini	64	F	64191	Incisional	17.10.14	Sublay	72	7			
8	Selvi	44	F	67188	Incisional	24.10.14	Sublay	70	8			
9	Jothi	43	F	69005	Incisional	31.10.14	Sublay	72	7			
10	Rahamath Kani	30	F	66994	Umbilical Hernia	03.11.14	Onlay	50	6		Deep Sepsis	
11	Rukmani	45	F	70085	Umbilical Hernia	07.11.14	Onlay	50	6		Sup.Sepsis	
12	Rahmath Nisha	42	F	70947	Incisional	11.11.14	Sublay	70	7	Haemorrhage		
13	Mahesh	40	M	72056	Incisional	12.11.14	Onlay	65	7		Deep Sepsis	Recurrance
14	Dhanalakshmi	39	F	71736	Umbilical Hernia	12.11.14	Onlay	60	7		Sup.Sepsis	

15	Saroja	44	F	71770	Incisional	14.11.14	Sublay	70	7	Haemorrhage		
16	Lakshmi	33	F	74126	Incisional	21.11.14	Sublay	65	7			
17	Chitra	37	F	73546	Incisional	21.11.14	Onlay	62	7	Haemorrhage	Sup.Sepsis	
18	Sheela	49	F	71816	Incisional	21.11.14	Onlay	60	7		Sup.Sepsis	
19	Shanthi	54	F	75770	Umbilical Hernia	28.11.14	Onlay	54	7			
20	Balachandran	57	M	78810	Incisional	09.12.14	Sublay	70	8	Haemorrhage		
21	Kaliammal	55	F	78494	Incisional	10.12.14	Onlay	65	7			
22	Savithri	28	F	79367	Umbilical Hernia	14.12.14	Sublay	65	7			
23	Tamilarasi	38	F	80778	Incisional	19.12.14	Sublay	70	7	Haemorrhage		
24	Jothi	40	F	80951	Incisional	22.12.14	Sublay	68	8			
25	Maheswari	32	F	82942	Umbilical Hernia	29.12.14	Onlay	60	7		Sup Sepsis	
26	Purushothaman	26	M	1156	Umbilical Hernia	09.01.15	Onlay	55	7		Sup Sepsis	
27	Vennila	34	F	915	Incisional	14.01.15	Onlay	62	7			
28	Rukkammal	75	F	994	Incisional	15.1.15	Sublay	70	8		Deep Sepsis	
29	Pappal	30	F	2582	Umbilical Hernia	21.1.15	Onlay	55	7		Deep Sepsis	
30	Balakrishnan	38	M	9998	Umbilical Hernia	13.02.15	Onlay	50	7			
31	Pushpa	30	F	11889	Umbilical Hernia	20.02.15	Onlay	55	7			
32	Antony	44	M	11299	Incisional	25.02.15	Onlay	65	7		Deep Sepsis	

33	Umamaheswari	34	F	13712	Incisional	25.02.15	Onlay	66	7			
34	Lakshmi	55	F	15330	Incisional	09.03.15	Sublay	70	8	Haemorrhage	Sup Sepsis	
35	Parvathy	52	F	20043	Incisional	25.03.15	Onlay	60	7		Deep Sepsis	
36	Arukkani	55	F	20042	Umbilical Hernia	25.03.15	Onlay	55	7	Haemorrhage		
37	Mayilsamy	44	M	21683	Umbilical Hernia	01.04.15	Onlay	50	7			
38	Vijaya	58	F	27242	Epigastric	25.04.15	Onlay	40	5			
39	Padmavathy	50	F	28836	Incisional	02.05.15	Sublay	66	7			
40	Latha	32	F	13977	Umbilical Hernia	09.05.15	Sublay	66	7			
41	Maheswari	31	F	33301	Umbilical Hernia	22.05.15	Sublay	64	7			
42	Elamurugan	33	M	27683	Incisional	03.06.15	Onlay	60	7		Sup Sepsis	
43	Kannammal	23	F	36539	Incisional	03.06.15	Onlay	62	7			
44	Malathy	35	F	34844	Umbilical Hernia	05.06.15	Onlay	50	6			
45	Parvathy	45	F	40109	Incisional	19.06.15	Onlay	60	8	Haemorrhage	Deep Sepsis	
46	Mani	61	M	32274	Incisional	03.06.15	Onlay	60	7			
47	Rajamani	55	F	35807	Umbilical Hernia	07.06.15	Onlay	50	7			
48	Avana Gurusamy	65	M	40065	Umbilical Hernia	19.06.15	Onlay	55	6			
49	Angathal	70	F	43613	Incisional	01.07.15	Onlay	60	7	Haemorrhage	Deep Sepsis	
50	Senthil Kumar	37	M	47675	Incisional	24.07.15	Sublay	70	7			